

CLAIMS

What is claimed is:

1. A method for optimizing a design of a roller cone drill bit, comprising:
5 simulating the bit drilling through a selected earth formation;
 adjusting at least one design parameter of the bit;
 repeating the simulating the bit drilling; and
 repeating the adjusting and the simulating until a lateral force on the bit is
optimized.

2. A method for balancing lateral forces on a plurality of roller cones on a roller cone drill bit during drilling, comprising:

(a) calculating, from a geometry of cutting elements on each of the roller cones and an earth formation to be drilled by the bit, a lateral force on each of the cutting elements;

(b) simulating incrementally rotating the bit and recalculating the lateral force on each of the cutting elements;

(c) repeating the simulating incrementally rotating and recalculating for a selected number of incremental rotations;

(d) combining the lateral force on the cutting elements on each one of the roller cones to determine the lateral force on each of the roller cones;

(e) adjusting at least one bit design parameter and repeating (a) through (d); and

(f) repeating (e) at least until a difference between the lateral force on each of the roller cones is less than the difference between the lateral force on each of the roller cones determined prior to the adjusting the at least one bit design parameter.

3. The method as defined in Claim 2 wherein the at least one bit design parameter comprises a number of cutting elements on at least one of the cones.

4. The method as defined in Claim 2 wherein the at least one bit design parameter comprises a location of cutting elements on at least one of the cones.

5. The method as defined in Claim 2 wherein the at least one bit design parameter comprises an orientation of at least one of the cutting elements on at least one of the cones.